

Dust-Tolerant, High Pressure Oxygen Quick Disconnect for Advanced Spacesuit and Airlock Applications, Phase I

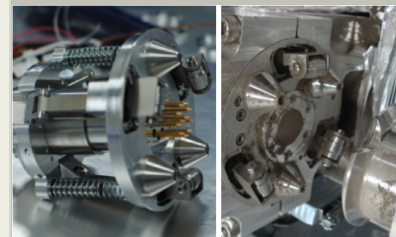
Completed Technology Project (2016 - 2016)



Project Introduction

Future human missions to Mars, the Moon, Near-Earth Objects (NEOs) and other planetary bodies will require a spacesuit equipped with a compact, lightweight, reliable, dust tolerant, high pressure oxygen quick disconnect (QD) for astronaut extravehicular activity. The next generation of QDs must transfer high pressure oxygen (HPO₂) between the vehicle and space suits under adverse conditions, including an extreme range of temperatures, in a high vacuum, and amid pervasive dust. Currently, no QDs deliver O₂ at sufficient pressure, nor are they able to mate in the presence of dust.

Honeybee Robotics proposes to develop a dust tolerant, high pressure oxygen quick disconnect suitable for advanced spacesuit and airlock applications. This system will integrate form, fit, and function of existing and new subsystems for umbilical quick disconnects, leveraging both the design work completed to-date by Oceaneering (provided by NASA) and the dust-tolerant QD connector prototypes that Honeybee developed to TRL 6 for spacesuit applications for NASA's Constellation program. These QDs have been successfully tested at 6×10^{-6} mbar coated in JSC-1AF lunar dust simulant. Materials integral to the dust-tolerant system can perform acceptably at -160°C. The Phase 1 effort will focus on modifications necessary to apply existing dust-tolerant electrical connection technology (US Patent No. 8,011,941) to high-pressure oxygen delivery. This will include developing and performance testing a model in the presence of significant amounts of JSC-1A lunar simulant. A successful end point will demonstrate the design's capability to transmit gas over the interface and prevent dust from entering the gas stream over multiple mate/de-mate cycles. A design path will be laid out for Phase 2 to address remaining technical challenges and create higher-fidelity hardware suitable for testing at NASA.



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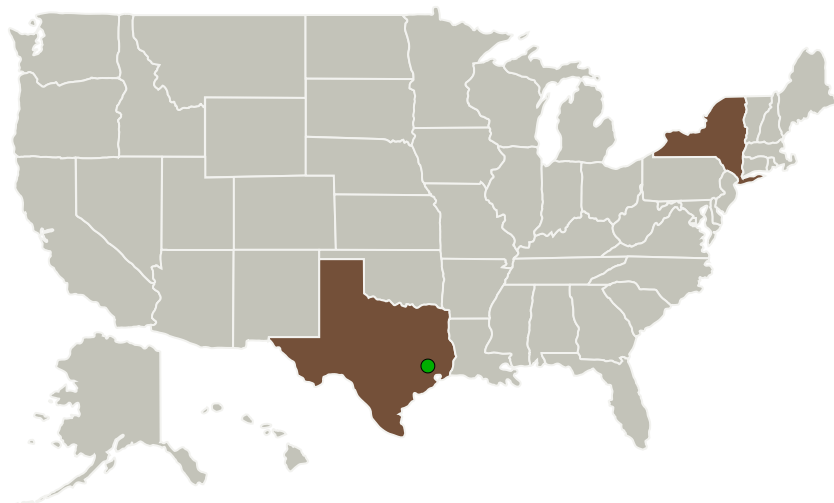
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Honeybee Robotics, Ltd.	Lead Organization	Industry	Pasadena, California
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations

New York	Texas
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Project Transitions



June 2016: Project Start



December 2016: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139792>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Honeybee Robotics, Ltd.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

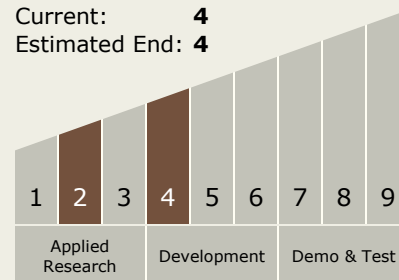
Carlos Torrez

Principal Investigator:

Jason Herman

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4

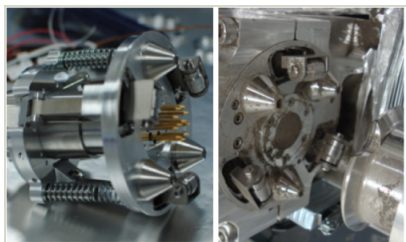


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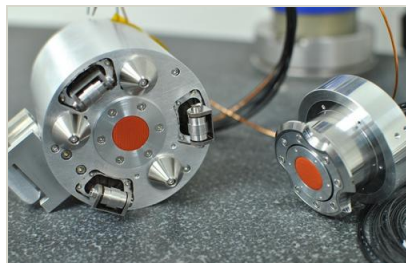


Images



Briefing Chart Image

Dust-Tolerant, High Pressure Oxygen Quick Disconnect for Advanced Spacesuit and Airlock Applications, Phase I
(<https://techport.nasa.gov/image/134242>)



Final Summary Chart Image

Dust-Tolerant, High Pressure Oxygen Quick Disconnect for Advanced Spacesuit and Airlock Applications, Phase I Project Image
(<https://techport.nasa.gov/image/130285>)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.2 Extravehicular Activity Systems
 - └ TX06.2.2 Portable Life Support System

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System